

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re application of)
RONALD D. HATFIELD ET AL.) Group Art Unit 1616
A Process for Inhibition of) Examiner A. N. Pryor
Proteolytic Activity During)
the Ensiling of Forages) Confirmation No. 3661
Serial No. 10/736,155)
Filed December 15, 2003)

The Honorable
The Commissioner of Patents
Sir:

BRIEF ON APPEAL UNDER 37 CFR 1.192

This Appeal Brief is responsive to the final rejection of claims 1-5, 7, 8, 10, 11, 13, and 14 in the above-identified U.S. patent application.

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FEE PAYMENT AND EXTENSION OF TIME

The Commissioner is authorized to charge the Appeal Brief Fee of \$540.00, and any delinquencies in fees, to Deposit Account No. 50-2132.

It is respectfully requested that the period for response to the Notice of Appeal dated August 20, 2009, be extended one (1) month so as to expire on November 20, 2009. The Commissioner is further authorized to charge the 1-month extension fee of \$130.00, as well as any delinquencies in fees, to Deposit Account No. 50-2132.

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REAL PARTY IN INTEREST

The real party in interest is The United States of America, as represented by the Secretary of Agriculture, the assignee of record.

RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to appellant, appellants' legal representative, or the assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

STATUS OF CLAIMS

Claims 1-5, 7, 8, 10, 11, 13, and 14 are now of record in this application. Claims 1-5, 7, 8, 10, 11, 13, and 14 have been rejected. No claims have been allowed. Claims 1-5, 7, 8, 10, and 11 were amended, claims 6, 9, and 12 were cancelled, and new claims 13 and 14 were added by the previously submitted amendments. Claims 1-5, 7, 8, 10, 11, 13, and 14 are appealed.

STATUS OF AMENDMENTS

No Amendments After Final Rejection have been submitted in response to the current Final rejection, dated May 21, 2009. However, Appellants note that two Amendments After Final

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Rejection were submitted in response to a first Final rejection, which was dated January 16, 2008, but the finality of that first Final rejection was withdrawn in the Office action dated May 29, 2008. The first Amendment After Final Rejection was submitted on March 5, 2008, and was not entered. The second Amendment After Final Rejection was submitted on April 24, 2008, and was entered. The claims were subsequently amended by additional Amendments, submitted July 17, 2008, and February 12, 2009, neither of which were after Final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claims 1 and 14 are of record in this application.

The independent claims are drawn to a method for reducing the proteolysis of ensiled crops (also known as silage). Independent claim 1 is limited to a method comprising contacting a crop material to be ensilaged with an o-diphenol compound and a polyphenol oxidase at the time of ensilaging (page 5, paragraph no. 0012, lines 1-5, and page 10, paragraph no. 0022, lines 1-7). The o-diphenol compound and a polyphenol oxidase are provided in an amount effective to reduce the degree of proteolysis of the crop material (page 6, paragraph no. 0013, lines 5-7, and page 13, paragraph no. 0027, lines 1-5). Appellants note that the

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above-mentioned paragraph nos. 0022 and 0027 were amended by the Amendment submitted May 4, 2007, to correct a typographical error and substitute the recitation of "o-diphenol" for "o-diphenyl" therein.

Independent claim 14 is identical to independent claim 1 with the sole exception that claim 14 recites a method "consisting essentially of" while claim 1 recites "comprising".

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues for consideration as set forth in the Office actions are as follows:

- (1) Whether claims 1-5, 7, 8, 10, 11, 13, and 14 are unpatentable under 35 U.S.C. 103 as being obvious over Myers et al. (U.S. patent application publication no. 2003/0044448) and Asrar et al. (U.S. patent application publication no. 2004/0259732).

ARGUMENTS

As described hereinbelow, independent claims 1 and 14, and dependent claim 13, are believed to be separately patentable. Thus, appellants have presented three groups of claims for consideration: A) claims 1-5, 7, 8, 10, and 11; B) claim 13; and C) claim 14.

Rejection Under 35 U.S.C. 103

A) Claim group 1, claims 1-5, 7, 8, 10, and 11

Claims 1-5, 7, 8, 10, 11, 13, and 14 have been rejected under 35 U.S.C. 103 as being unpatentable over Myers et al. and Asrar et al. The Examiner has taken the position that it would have been obvious to add the PPO of Asrar et al. to the method of Myers et al. Appellants respectfully disagree.

Myers et al. (hereinafter referred to as Myers) is drawn to a method for preserving agricultural by-products which are very wet, including wet corn gluten feed (WCGF), dried distillers grains, and other by-products (see page 1, paragraph no. 0005, lines 5-10, paragraph no. 0006, and paragraph no. 0007). The material is treated with an organic acid in combination with an antioxidant and/or a surfactant (page 1, paragraph no. 0011). Rosemary extract including rosmarinic acid is disclosed as a preferred antioxidant. The organic acid treatment is explicitly selected to kill or prevent the growth of bacteria and yeasts, and "provide efficacy over a broad range of microorganisms" (page 1, paragraph no. 0013 and the Examples).

Asrar et al. (hereinafter referred to as Asrar) is drawn to a method for treating plants and seeds to improve the plant health or yield (page 1, paragraph no. 0003). The plant or plant propagation material (such as a seed, see page 6, paragraph no.

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0078) is treated with an antioxidant and a pesticide in an amount to improve the health and/or yield of the plant (page 2, paragraph no. 0023). The term "improves plant health" is defined on page 6, paragraph no. 0075, and generally relates to the health of the growing plant or the ability of the seeds to develop into plants. Polyphenol oxidase (PPO) is listed among hundreds of potential antioxidants (pages 5-6, paragraph nos. 0058-0073, note 0066).

The instant invention is drawn to a method for inhibiting the proteolysis or degradation of proteins present in ensiled crops, which are also commonly known as silage. The art has long recognized the problem of proteolysis in silage and has proposed a variety of solutions for its inhibition (pages 1-2, bridging paragraph no. 0002, and pages 2-3, bridging paragraph no. 0004). In accordance with appellants' invention, the forage to be ensilaged is treated with a plant-derived polyphenol oxidase (PPO) in conjunction with an o-diphenol compound (page 4, paragraph no. 0008, lines 1-4). Appellants have discovered that this treatment of the forage with PPO and an o-diphenol compound at the time of ensilaging is effective for prevention of excessive proteolysis of proteins (page 5, paragraph no. 0012, lines 1-5, and page 10, paragraph no. 0022, lines 1-7). This is not disclosed or suggested by the prior art.

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At the outset, appellants note that neither Myers nor Asrar are even remotely related to silage or the process of ensiling as required by the claims of record. "Silage" (also known as ensilage) is an art recognized term, as is the process of its production. As defined by Webster's Third New International Dictionary of the English Language Unabridged (G. & C. Merriam, Springfield, MA, 1961, a copy of which is attached hereto and cited in the Evidence Appendix) silage is:

"fodder (as of field corn, sorghum, grass, or clover) either green or mature converted into succulent winter feed for livestock through processes of fermentation usu. by being cut fine and blown into an airtight chamber (as a silo) where it is compressed to exclude air and **where it undergoes an acid fermentation that retards spoiling** - called also ensilage" (emphasis added).

Similarly, the CRC Dictionary of Agricultural Sciences (Robert A. Lewis, CRC Press, Boca Raton, FL, 2002, a copy of which is also attached hereto and cited in the Evidence Appendix) defines silage as:

"feed for livestock (fodder) prepared by storing and **fermenting** green forage plants (often chopped stalks and leaves of corn) in a silo" (emphasis added).

However, Myers is drawn to a method for preserving agricultural by-products of grain processing which are very wet, such as wet corn gluten feed (WCGF) and dried distillers grains (page 1, paragraph no. 0005, lines 5-10, and paragraph no. 0006, lines 1-17). None of these materials are harvested crops, much less

silage or ensiled crops. For instance, corn gluten feed is a by-product of the wet-milling of corn to produce corn meal or starch, and comprises corn gluten protein and bran (see again, Webster's Third New International Dictionary of the English Language Unabridged, page 508, a copy of which is attached hereto and cited in the Evidence Appendix). On the other hand, wet distiller's grains and solubles (WDGS) such as disclosed by Myers are the cereal by-product or residue of the distillation process to produce alcohol (see Webster's Third New International Dictionary of the English Language Unabridged, pages 658-659, a copy of which is attached hereto and cited in the Evidence Appendix). Clearly, none of these materials disclosed by Myers are silage. The Examiner has referred to the disclosure of Myers in Experiment 3 that wet distillers grains and solubles (WDGS, note the reference in Table 8) were "stored in a silage bag" (page 4, paragraph no. 0043, lines 1-5). However, the disclosure of a "silage bag" at page 4, paragraph no. 0043 of Myers is merely a reference to the type of container in which the treated material, wet distiller's grains and solubles, was held. The act by Myers of placing the wet distillers grains and solubles in a silage bag does not make them silage any more than they would become bread simply by placing them in a bread bag.

Asrar is even further removed than Myers. Asrar is drawn to a process for improving the health of growing plants or seeds growing into plants. In contrast, as noted above, silage is harvested crop material which is stored and fermented to produce animal feed.

The difference in the fields of application of the references from the claimed invention and each other not only fails to teach or suggest the instant invention, but also would teach away from the combination of the references. In brief, a practitioner skilled in the art would not add the treatment of Asrar, which is disclosed for improving the health of growing plants, to the treatment of Myers which is for preserving agricultural by-products. The by-products of Myers are obviously not viable. You can't "improve their health." Thus, the skilled practitioner would have no reason to add the treatment of Asrar to the treat the by-products of Myers.

Moreover, even if the references were combined as suggested, the combination would not arrive at the claimed invention. At best, the combination would result in a method for preserving wet agricultural by-products. Again these by-products are not silage as claimed in the instant application.

In addition to failing to disclose or suggest silage, applicants submit that the disclosures of the references would

actually teach away from treating silage. Specifically, Myers expressly states that the object of the organic acid treatment is to kill or prevent the growth of bacteria and yeasts, and "provide efficacy over a broad range of microorganisms" (col. 2, paragraph no. 0013 and the Examples). However, as noted above, it is well known that the preparation of silage (or the process of ensiling) provides for the fermentation of the crop material by microorganisms (again, see the definitions of silage in the attached Webster's Unabridged Dictionary and the CRC Dictionary). Thus, a practitioner skilled in the art seeking to produce silage would not employ a treatment such as disclosed by Myers which seeks to kill or inhibit a broad range of microorganisms. To do so would likely destroy or inhibit the microorganisms necessary for the acid fermentation which is necessary for the ensiling of the crop material.

Similarly, Asrar is drawn to the treatment of plants and seeds to improve plant health. However, silage is an animal feed. It is not a growing plant nor is it planted. A practitioner skilled in the art desiring to produce silage would not apply a treatment such as Asrar which is disclosed to improve the health of viable plants.

Finally, as disclosed in the instant specification at page 8, paragraph no. 0018, and page 10, paragraph no. 0022, in the

process of the invention the added o-diphenol is converted by the polyphenol oxidase to o-quinones. These o-quinones react with proteases in the plant material, inhibiting their activity (and consequently preventing protein degradation). This is not disclosed or suggested by the prior art and is not expected from the disclosures of the references.

B) Claim group 2, claim 13

Dependent claim 13 is limited to the Markush group of crop materials selected from the group consisting of alfalfa, red clover, corn, wheat, triticale, rye, barley, oat, pea, sorghum, sudan, millet, and lentil. However, as noted above, Myers is drawn to a method for preserving agricultural by-products which are very wet, such as wet corn gluten feed (WCGF) and dried distillers grains, while Asrar is drawn to a process for improving the health of growing plants or seeds growing into plants. Thus, even if the references were combined as suggested by the Examiner, the combination would not arrive at the claimed invention. At best, the combination would result in a method for preserving wet agricultural by-products. Again these by-products are not silage, and clearly are not the ensiled crop materials recited in claim 13.

C) Claim group 3, claim 14

The composition of Myers is disclosed to comprise one or more organic acids with one or both of an antioxidant and a surfactant (page 1, paragraph no. 0008, lines -13). As noted above, Myers expressly states that the object of the organic acid treatment is to kill or prevent the growth of bacteria and yeasts, and "provide efficacy over a broad range of microorganisms" (col. 2, paragraph no. 0013, lines 1-13, and page 5, paragraph no. 0053, lines 1-6 and 9-16). However, also as noted above, it is well known that the preparation of silage (or the process of ensiling) provides for the fermentation of the crop material by microorganisms. Thus, a practitioner skilled in the art seeking to produce silage would not employ a treatment such as disclosed by Myers which seeks to kill or inhibit a broad range of microorganisms. To do so would likely destroy or inhibit the microorganisms necessary for the acid fermentation during the ensiling.

Independent claim 14 is expressly limited to a method of treating ensiled crops "consisting essentially of" contacting the crop material at the time of ensilaging with an o-diphenol compound and a polyphenol oxidase are provided in an amount effective to reduce the degree of proteolysis of the crop material. Appellants submit that the limitation of "consisting

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essentially of" precludes the use of organic acids such as disclosed by Myers which would destroy or inhibit the microorganisms necessary for the acid fermentation during the ensiling.

In view of the foregoing, applicants respectfully submit that claims 1-5, 7, 8, 10, 11, 13, and 14 distinguish over the prior art of record. Allowance thereof is respectfully requested.

Respectfully submitted,

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CLAIMS APPENDIX

1. A method for the reduction of proteolysis in ensiled crops comprising contacting a crop material to be ensilaged with an *o*-diphenol compound and polyphenol oxidase at the time of ensilaging in an amount effective to reduce the degree of proteolysis of the crop material.
2. The method of claim 1 wherein the amount of said *o*-diphenol and said polyphenol oxidase is sufficient to reduce the degree of proteolysis by at least 20%.
3. The method of claim 1 wherein the *o*-diphenol compound is applied to the crop material to be ensilaged at a rate ranging from about 5 to about 30 micromoles per gram fresh weight and the polyphenol oxidase is applied to the crop material to be ensilaged at a rate ranging from about 0.1 to about 1.0 unit per gram fresh weight.
4. The method of claim 1 wherein the crop material to be ensilaged is macerated to a conditioning index ranging from 30 to 60.

5. The method of claim 1 wherein the o-diphenol compound is selected from the group consisting of caffeic acid, catechol, chlorogenic acid, phasic acid, rosmarinic acid, caffeoyl tartrate, and caffeoyl glucose.

7. A method for the reduction of proteolysis in ensiled crops comprising contacting a polyphenol oxidase transformed crop to be ensilaged with an o-diphenol compound at the time of ensilaging in an amount effective to reduce the degree of proteolysis in the crop.

8. The method of claim 7 wherein the quantity of said o-diphenol compound is sufficient to reduce the degree of proteolysis by at least 20%.

10. The method of claim 7 wherein the crop to be ensilaged is macerated to a conditioning index ranging from about 30 to about 60.

11. The method of claim 7 wherein the o-diphenol compound is selected from the group consisting of caffeic acid, catechol, chlorogenic acid, phasic acid, rosmarinic acid, caffeoyl tartrate, and caffeoyl glucose.

13. The method of claim 1 wherein said crop material is selected from the group consisting of alfalfa, red clover, corn, wheat, triticale, rye, barley, oat, pea, sorghum, sudan, millet, and lentil.

14. A method for the reduction of proteolysis in ensiled crops consisting essentially of contacting a crop material to be ensilaged with an *o*-diphenol compound and polyphenol oxidase at the time of ensilaging in an amount effective to reduce the degree of proteolysis of the crop material.

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EVIDENCE APPENDIX

- Webster's Third New International Dictionary of the English Language Unabridged, G. & C. Merriam, Springfield, MA, 1961, pages 508, 658-659, and 2116 (6 pages).
- Robert A. Lewis, CRC Dictionary of Agricultural Sciences, CRC Press, Boca Raton, FL, 2002, page 590 (3 pages).

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RELATED PROCEEDINGS APPENDIX

None